

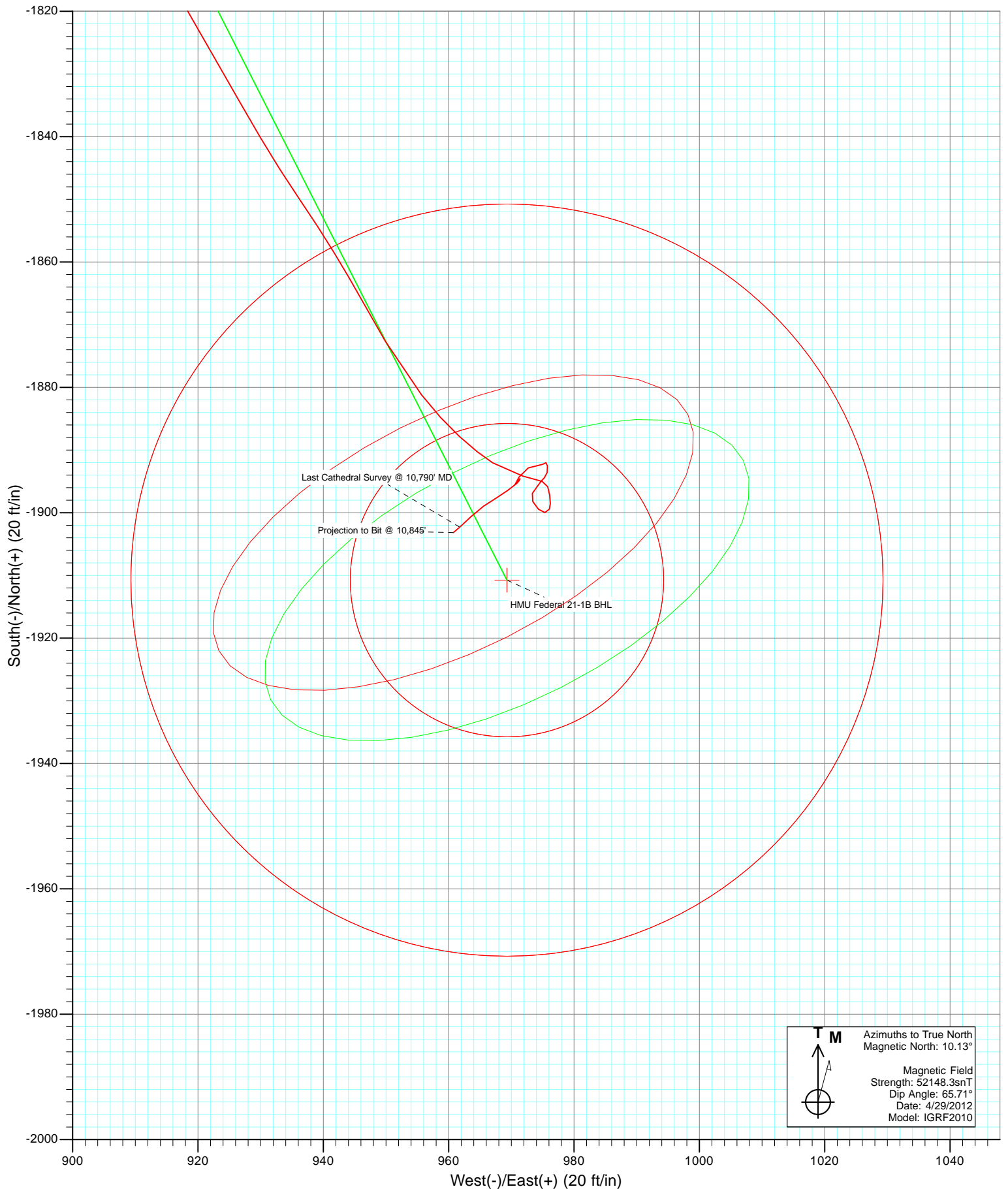
Azimuths to True North  
Magnetic North: 10.13°

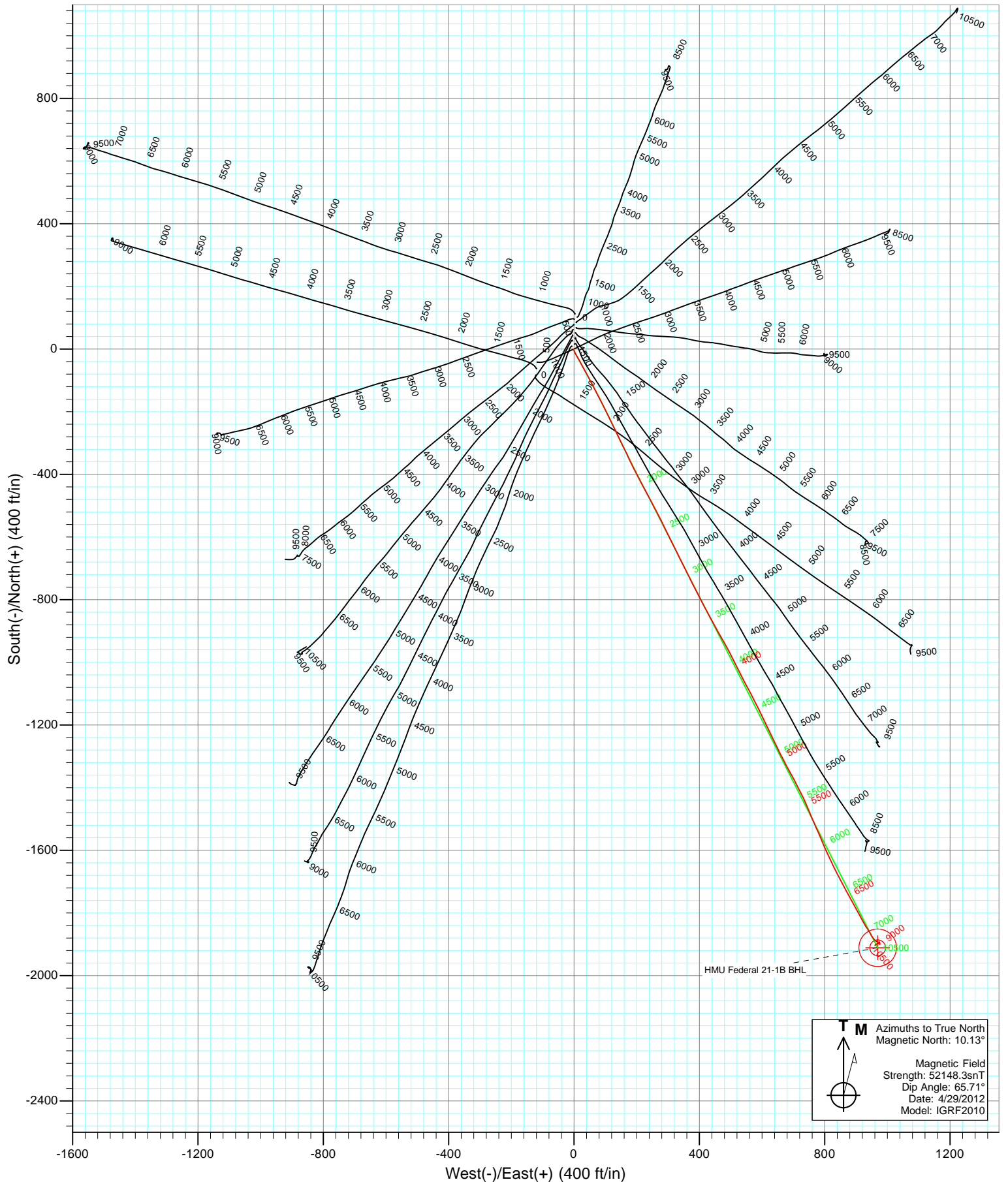
Magnetic Field  
Strength: 52148.3snT  
Dip Angle: 65.71°  
Date: 4/29/2012  
Model: IGRF2010

#### DESIGN DETAILS: DD

115554/127055 (SH)125148/133055 (MH): SC  
KBE @ 7667.0ft (Original Well Elev)

Target	Azimuth	Origin	N/S	E/W	From TVD
HMU Federal 21-1B BHL	153.10	Slot	N 0.0	E 0.0	0.0





# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU Federal 21-1B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Site:</b>	J16W Pad	<b>MD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Well:</b>	HMU Federal 21-1B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Mamm Creek		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Central Zone		

Site		J16W Pad			
Site Position:		Northing:	1,594,381.52 ft	Latitude:	39.443239
From:	Lat/Long	Easting:	2,357,395.39 ft	Longitude:	-107.775670
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.44 °

Well	HMU Federal 21-1B					
Well Position	+N/-S	0.0 ft	Northing:	1,594,274.99 ft	Latitude:	39.442946
	+E/-W	0.0 ft	Easting:	2,357,386.22 ft	Longitude:	-107.775693
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,645.0 ft

<b>Wellbore</b>	DD				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	4/29/2012	10.13	65.71	52,148

<b>Design</b>	DD				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	153.10	

<b>Survey Program</b>	<b>Date</b>	5/11/2012			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
143.0	10,845.0	Survey #1 (DD)	MWD	Geolink MWD	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
143.0	0.40	205.40	143.0	-0.5	-0.2	0.3	0.28	0.28		
173.0	0.20	149.70	173.0	-0.6	-0.2	0.4	1.10	-0.67		
204.0	0.20	280.20	204.0	-0.6	-0.3	0.4	1.17	0.00		
235.0	0.30	254.10	235.0	-0.6	-0.4	0.4	0.48	0.32		
265.0	0.30	167.40	265.0	-0.7	-0.4	0.5	1.37	0.00		
295.0	0.70	180.40	295.0	-1.0	-0.4	0.7	1.38	1.33		
326.0	1.50	183.10	326.0	-1.6	-0.5	1.2	2.59	2.58		
357.0	1.80	168.30	357.0	-2.5	-0.4	2.0	1.67	0.97		
388.0	2.90	159.00	388.0	-3.7	0.0	3.3	3.74	3.55		
419.0	3.80	154.80	418.9	-5.3	0.7	5.1	3.01	2.90		
450.0	5.10	159.30	449.8	-7.6	1.6	7.5	4.34	4.19		
480.0	6.10	156.70	479.7	-10.3	2.7	10.4	3.44	3.33		

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU Federal 21-1B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Site:</b>	J16W Pad	<b>MD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Well:</b>	HMU Federal 21-1B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
511.0	7.30	152.90	510.4	-13.5	4.3	14.0	4.12	3.87	
542.0	8.60	151.00	541.1	-17.3	6.3	18.3	4.28	4.19	
572.0	10.00	149.00	570.8	-21.5	8.7	23.1	4.79	4.67	
603.0	11.10	149.50	601.2	-26.4	11.6	28.8	3.56	3.55	
634.0	12.30	151.20	631.6	-31.9	14.8	35.1	4.03	3.87	
664.0	13.10	151.30	660.9	-37.6	17.9	41.7	2.67	2.67	
695.0	14.20	150.40	691.0	-44.0	21.5	49.0	3.61	3.55	
725.0	14.80	151.90	720.0	-50.6	25.1	56.5	2.36	2.00	
755.0	15.20	152.00	749.0	-57.5	28.8	64.3	1.34	1.33	
786.0	15.80	150.70	778.9	-64.7	32.7	72.5	2.24	1.94	
878.0	16.00	151.70	867.3	-86.8	44.9	97.7	0.37	0.22	
970.0	18.20	152.20	955.3	-110.7	57.6	124.8	2.40	2.39	
1,061.0	18.60	153.60	1,041.6	-136.3	70.7	153.5	0.65	0.44	
1,153.0	19.10	152.30	1,128.7	-162.7	84.2	183.2	0.71	0.54	
1,245.0	19.80	153.70	1,215.4	-190.0	98.1	213.8	0.91	0.76	
1,336.0	18.30	153.60	1,301.5	-216.6	111.3	243.5	1.65	-1.65	
1,429.0	18.90	154.00	1,389.6	-243.3	124.4	273.2	0.66	0.65	
1,521.0	18.00	154.10	1,476.9	-269.4	137.1	302.3	0.98	-0.98	
1,613.0	18.10	154.70	1,564.3	-295.1	149.4	330.8	0.23	0.11	
1,656.0	18.50	153.60	1,605.2	-307.3	155.3	344.3	1.23	0.93	
1,741.0	19.00	154.70	1,685.7	-331.9	167.2	371.6	0.72	0.59	
1,836.0	19.90	153.70	1,775.2	-360.4	181.0	403.3	1.01	0.95	
1,931.0	19.10	154.30	1,864.8	-388.9	194.9	435.0	0.87	-0.84	
2,026.0	18.40	151.80	1,954.7	-416.1	208.7	465.5	1.12	-0.74	
2,122.0	19.10	150.80	2,045.7	-443.1	223.5	496.3	0.80	0.73	
2,217.0	17.70	152.10	2,135.8	-469.5	237.9	526.3	1.54	-1.47	
2,313.0	18.10	151.60	2,227.1	-495.5	251.8	555.8	0.45	0.42	
2,408.0	17.40	154.10	2,317.6	-521.3	265.0	584.8	1.09	-0.74	
2,503.0	17.40	153.70	2,408.3	-546.8	277.5	613.2	0.13	0.00	
2,599.0	17.70	153.10	2,499.8	-572.6	290.5	642.1	0.36	0.31	
2,694.0	17.50	153.00	2,590.4	-598.3	303.5	670.8	0.21	-0.21	
2,790.0	18.10	153.70	2,681.8	-624.5	316.7	700.2	0.66	0.62	
2,885.0	18.00	153.10	2,772.1	-650.8	329.9	729.6	0.22	-0.11	
2,980.0	18.90	154.10	2,862.2	-677.7	343.2	759.7	1.00	0.95	
3,075.0	18.80	153.90	2,952.1	-705.3	356.7	790.4	0.13	-0.11	
3,171.0	18.80	153.70	3,043.0	-733.1	370.3	821.3	0.07	0.00	
3,266.0	18.40	152.70	3,133.0	-760.1	384.0	851.6	0.54	-0.42	
3,362.0	17.60	152.80	3,224.3	-786.5	397.6	881.3	0.83	-0.83	
3,457.0	17.50	151.80	3,314.9	-811.9	410.9	909.9	0.33	-0.11	
3,552.0	17.40	151.50	3,405.5	-836.9	424.4	938.4	0.14	-0.11	
3,647.0	18.70	152.40	3,495.9	-862.9	438.2	967.8	1.40	1.37	
3,743.0	18.00	150.80	3,587.0	-889.5	452.6	998.0	0.90	-0.73	
3,838.0	17.80	150.10	3,677.4	-914.9	467.0	1,027.2	0.31	-0.21	
3,934.0	17.50	150.30	3,768.9	-940.2	481.5	1,056.3	0.32	-0.31	
4,029.0	16.90	152.50	3,859.6	-964.8	494.9	1,084.3	0.93	-0.63	
4,124.0	18.20	153.60	3,950.2	-990.4	507.9	1,113.0	1.41	1.37	
4,220.0	17.50	153.50	4,041.6	-1,016.7	521.0	1,142.4	0.73	-0.73	
4,316.0	17.50	153.00	4,133.1	-1,042.5	534.0	1,171.3	0.16	0.00	
4,411.0	17.50	152.30	4,223.7	-1,067.9	547.1	1,199.9	0.22	0.00	
4,506.0	16.70	151.00	4,314.5	-1,092.4	560.4	1,227.8	0.93	-0.84	
4,602.0	18.60	153.70	4,406.0	-1,118.2	573.9	1,256.9	2.15	1.98	
4,697.0	17.80	153.70	4,496.3	-1,144.8	587.0	1,286.5	0.84	-0.84	
4,792.0	18.10	152.30	4,586.6	-1,170.9	600.3	1,315.8	0.55	0.32	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	EnCana Oil & Gas (USA) Inc	<b>Local Co-ordinate Reference:</b>	Well HMU Federal 21-1B
<b>Project:</b>	Mamm Creek	<b>TVD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Site:</b>	J16W Pad	<b>MD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Well:</b>	HMU Federal 21-1B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
4,887.0	19.40	155.40	4,676.6	-1,198.3	613.7	1,346.3	1.72	1.37	
4,982.0	18.60	155.20	4,766.4	-1,226.4	626.7	1,377.2	0.84	-0.84	
5,078.0	18.60	154.00	4,857.4	-1,254.1	639.8	1,407.9	0.40	0.00	
5,173.0	18.00	153.70	4,947.6	-1,280.9	652.9	1,437.7	0.64	-0.63	
5,267.0	18.90	152.30	5,036.8	-1,307.4	666.4	1,467.4	1.07	0.96	
5,363.0	18.30	152.40	5,127.7	-1,334.5	680.7	1,498.0	0.63	-0.62	
5,458.0	18.20	150.50	5,218.0	-1,360.6	694.9	1,527.8	0.64	-0.11	
5,553.0	18.80	154.00	5,308.1	-1,387.3	708.9	1,557.9	1.33	0.63	
5,648.0	18.40	151.70	5,398.1	-1,414.2	722.7	1,588.2	0.88	-0.42	
5,744.0	19.90	156.20	5,488.8	-1,442.5	736.5	1,619.7	2.19	1.56	
5,839.0	19.40	157.60	5,578.3	-1,471.9	749.0	1,651.5	0.72	-0.53	
5,934.0	19.40	156.60	5,667.9	-1,501.0	761.3	1,683.0	0.35	0.00	
6,028.0	19.40	156.00	5,756.5	-1,529.6	773.8	1,714.2	0.21	0.00	
6,123.0	18.40	157.20	5,846.4	-1,557.8	786.1	1,744.9	1.13	-1.05	
6,218.0	17.80	156.10	5,936.7	-1,584.9	797.8	1,774.4	0.73	-0.63	
6,313.0	16.80	155.20	6,027.4	-1,610.6	809.4	1,802.6	1.09	-1.05	
6,409.0	16.40	155.50	6,119.4	-1,635.6	820.8	1,830.0	0.43	-0.42	
6,504.0	17.50	153.80	6,210.3	-1,660.6	832.7	1,857.7	1.27	1.16	
6,599.0	17.50	152.50	6,300.9	-1,686.1	845.6	1,886.2	0.41	0.00	
6,694.0	17.30	150.50	6,391.5	-1,711.0	859.2	1,914.6	0.66	-0.21	
6,789.0	16.20	151.70	6,482.5	-1,735.0	872.4	1,942.0	1.21	-1.16	
6,884.0	15.60	151.20	6,573.9	-1,757.9	884.8	1,968.0	0.65	-0.63	
6,980.0	14.00	152.50	6,666.7	-1,779.5	896.4	1,992.5	1.70	-1.67	
7,074.0	13.00	152.00	6,758.1	-1,798.9	906.6	2,014.5	1.07	-1.06	
7,168.0	12.60	149.90	6,849.7	-1,817.1	916.7	2,035.3	0.65	-0.43	
7,263.0	11.80	150.60	6,942.6	-1,834.5	926.7	2,055.3	0.86	-0.84	
7,359.0	9.90	145.80	7,036.9	-1,849.9	936.2	2,073.3	2.19	-1.98	
7,454.0	7.90	150.20	7,130.7	-1,862.3	944.0	2,087.9	2.22	-2.11	
7,549.0	6.40	150.00	7,225.0	-1,872.6	949.9	2,099.7	1.58	-1.58	
7,645.0	6.00	141.90	7,320.4	-1,881.2	955.7	2,110.0	1.00	-0.42	
7,740.0	4.90	132.50	7,415.0	-1,887.8	961.7	2,118.7	1.49	-1.16	
7,835.0	3.30	122.30	7,509.8	-1,892.0	967.0	2,124.8	1.84	-1.68	
7,930.0	3.10	105.00	7,604.6	-1,894.1	971.8	2,128.9	1.03	-0.21	
8,026.0	0.80	107.70	7,700.5	-1,895.0	975.0	2,131.1	2.40	-2.40	
8,121.0	0.80	162.10	7,795.5	-1,895.9	975.8	2,132.2	0.77	0.00	
8,216.0	0.90	169.70	7,890.5	-1,897.2	976.1	2,133.6	0.16	0.11	
8,311.0	0.70	184.10	7,985.5	-1,898.5	976.2	2,134.8	0.30	-0.21	
8,406.0	0.40	196.50	8,080.5	-1,899.4	976.1	2,135.5	0.34	-0.32	
8,501.0	0.80	251.00	8,175.5	-1,900.0	975.4	2,135.7	0.69	0.42	
8,597.0	1.00	332.50	8,271.5	-1,899.4	974.4	2,134.7	1.23	0.21	
8,692.0	0.90	313.40	8,366.5	-1,898.2	973.4	2,133.2	0.35	-0.11	
8,787.0	1.10	32.10	8,461.5	-1,896.9	973.4	2,132.0	1.34	0.21	
8,883.0	0.70	40.30	8,557.5	-1,895.7	974.2	2,131.3	0.44	-0.42	
8,978.0	0.40	30.20	8,652.5	-1,895.0	974.8	2,130.9	0.33	-0.32	
9,074.0	0.50	52.10	8,748.5	-1,894.4	975.3	2,130.7	0.21	0.10	
9,170.0	0.70	10.80	8,844.4	-1,893.6	975.7	2,130.1	0.48	0.21	
9,265.0	0.60	352.10	8,939.4	-1,892.5	975.8	2,129.2	0.25	-0.11	
9,361.0	0.20	268.90	9,035.4	-1,892.0	975.5	2,128.7	0.63	-0.42	
9,456.0	0.50	231.80	9,130.4	-1,892.3	975.0	2,128.7	0.38	0.32	
9,551.0	0.70	273.10	9,225.4	-1,892.5	974.1	2,128.5	0.49	0.21	
9,646.0	1.10	245.50	9,320.4	-1,892.8	972.7	2,128.1	0.61	0.42	
9,742.0	1.50	211.00	9,416.4	-1,894.3	971.2	2,128.8	0.90	0.42	
9,837.0	0.10	155.00	9,511.4	-1,895.4	970.6	2,129.5	1.52	-1.47	

# Cathedral Energy Services

## Survey Report

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<b>Site:</b>	J16W Pad	<b>MD Reference:</b>	KBE @ 7667.0ft (Original Well Elev)
<b>Well:</b>	HMU Federal 21-1B	<b>North Reference:</b>	True
<b>Wellbore:</b>	DD	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	DD	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
9,932.0	0.30	48.80	9,606.4	-1,895.4	970.9	2,129.5	0.36	0.21	
10,027.0	0.40	34.70	9,701.4	-1,894.9	971.2	2,129.3	0.14	0.11	
10,123.0	0.10	341.10	9,797.4	-1,894.6	971.4	2,129.1	0.36	-0.31	
10,218.0	0.40	206.40	9,892.4	-1,894.8	971.2	2,129.2	0.50	0.32	
10,314.0	0.70	226.70	9,988.4	-1,895.5	970.6	2,129.5	0.37	0.31	
10,409.0	1.20	234.80	10,083.4	-1,896.5	969.4	2,129.8	0.54	0.53	
10,505.0	1.30	238.00	10,179.3	-1,897.6	967.7	2,130.1	0.13	0.10	
10,600.0	1.70	236.00	10,274.3	-1,899.0	965.6	2,130.4	0.42	0.42	
10,695.0	1.50	224.10	10,369.3	-1,900.7	963.5	2,130.9	0.41	-0.21	
10,790.0	1.40	229.70	10,464.2	-1,902.3	961.8	2,131.6	0.18	-0.11	Last Cathedral Survey @ 10,790' MD Projection to Bit @ 10,845'
10,845.0	1.40	229.70	10,519.2	-1,903.2	960.8	2,131.9	0.00	0.00	

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
HMU Federal 21-1B TOC - hit/miss target - Shape	0.00	0.00	7,626.0	-1,910.7	969.3	1,592,340.56	2,358,307.37	39.437700	-107.772261
- actual wellpath misses target center by 16.7ft at 7951.5ft MD (7626.0 TVD, -1894.4 N, 972.8 E)									
- Circle (radius 25.0)									
HMU Federal 21-1B BHI - hit/miss target - Shape	0.00	0.00	10,477.0	-1,910.7	969.3	1,592,340.56	2,358,307.37	39.437700	-107.772261
- actual wellpath misses target center by 17.0ft at 10790.0ft MD (10464.2 TVD, -1902.3 N, 961.8 E)									
- Circle (radius 60.0)									

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
10,790.0	10,464.2	-1,902.3	961.8	Last Cathedral Survey @ 10,790' MD	
10,845.0	10,519.2	-1,903.2	960.8	Projection to Bit @ 10,845'	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_